

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD  
SAN FRANCISCO BAY REGION

ORDER NO. 93-151  
(RESCINDING ORDER NO. 86-78)

FINAL SITE CLEANUP REQUIREMENTS FOR

INTERSIL, INC. AND

SOBRATO DEVELOPMENT COMPANY

for the property located at

1276 HAMMERWOOD AVENUE  
SUNNYVALE  
SANTA CLARA COUNTY

The California Regional Water Quality Control Board, San Francisco Bay Region (hereinafter called the Board) finds that:

1. Site Location and Description The site is located on the east side of Hammerwood Avenue on the northern edge of the City of Sunnyvale, Santa Clara County. The site is situated north of Interstate 101 and south of Highway 237. The site consists of one parcel, 1276 Hammerwood Avenue.
2. Prior to the 1960s, the land use in the proximity was predominantly agricultural. Most development dates from the 1960s or later and consists of industrial facilities with associated offices. Currently, the land use is mixed light industrial and residential. No residential use exists between the site and the southern San Francisco Bay. The Sunnyvale-Baylands County park is located approximately 1000 feet north of the site and borders Guadalupe Slough. The area north of Guadalupe Slough is mostly at or below sea level and is used for commercial salt evaporators.
3. Site History and Regulatory Status Sobrato Development Company (Sobrato) owns the 1276 Hammerwood Avenue property. Intersil occupied the facility to fabricate semiconductor wafers until 1983. Intersil used volatile chlorinated hydrocarbons in its fabricating process and utilized a 1,600 gallon acid neutralization system consisting in part of multiple plastic tanks enclosed in a concrete vault at the facility. This system was implemented to treat wastewater from the facility's industrial process before its discharge to the nearby sanitary sewer. Intersil ceased fabricating and subsequently discontinued the neutralization system in 1983. The facility was used as a warehouse for a while, and is now vacant.

Order No. 93-151  
Final Site Cleanup Requirements

4. Intersil is named as a discharger due to its chemical usage history as well as its chemical release to soil and groundwater underneath the 1276 Hammerwood Avenue property, during its occupancy of the property. Sobrato is named as a discharger because it is the current owner of the site, and will be responsible for compliance only in the event that Intersil fails to comply with the requirements of this Order. If additional information is submitted indicating that any other parties caused or permitted any waste to be discharged on the site where it entered or could have entered waters of the State, the Board will consider adding that party's name to this Order.
5. Previous Board Orders and Permits The Board has adopted the following orders and permits for the 1276 Hammerwood site:
  - Waste Discharge Requirements (Site Cleanup Requirements) Order No. 86-78, adopted October 15, 1986;
  - Waste Discharge Requirements Order No. 87-104 (NPDES Permit No. CA0029254), adopted August 19, 1987.
6. Hydrogeology The site vicinity is relatively flat, lying at an elevation between five and eight feet above mean sea level. The near surface deposits in the area are fine grained estuarine deposits consisting of unconsolidated, plastic clays and silty clays, which are rich in organic material that contains lenses and stringers of well sorted silt and sand, as well as beds of peat.
7. Groundwater generally exists in the permeable sand and gravel and alluvial fans deposited by east-flowing streams descending from the Santa Cruz Mountains. The regional groundwater gradient, as determined by other studies in the immediate area of the site, is northerly but may be affected by seasonal and tidal influence. The first shallow water-bearing zone at the site is encountered at a depth of approximately at 8 to 9 feet below ground surface (bgs). The intermediate water-bearing zone appears to be separated from the shallow zone by about 65 feet of thick clay aquitard.
8. Intersil conducted a survey of public and private wells within a one-mile radius of the site to assess any potential inter-aquifer conduits in 1986. Many of the deep wells are within a one-mile radius or more of the site. Other deep water-producing wells, registered with the Santa Clara Valley Water District within a 1/4-mile radius, have been abandoned or destroyed. It is unlikely that any well identified within the

Order No. 93-151  
Final Site Cleanup Requirements

survey area is acting as a conduit for inter-aquifer movement of groundwater at the former Intersil facility.

9. Intersil initiated soil and groundwater investigation at the site in May 1982 as part of the Underground Tank Leak Detection Program. Intersil found volatile organic compounds (VOCs) in soil and in groundwater underneath the facility.
10. Soil Investigation and Remediation Intersil collected extensive on-site soil borings during the 1985 through 1987 groundwater monitoring wells installations. Soil samples from the proximity of the former neutralization system and from southeast corner of the facility, a location once used as a chemical handling area, detected VOCs. The primary VOCs detected were 1,2-DCE, TCE, and Freon 113. The highest concentrations measured were 13 ppm of 1,2-DCE and 5.3 ppm of TCE in soil at 17.5 feet bgs. Soil analyses from all other borings at the site revealed VOCs concentration less than 2.8 ppm. In 1987, Intersil excavated and removed about 175 cubic yards of contaminated soil from the three locations that were detected above 1 ppm of total VOCs. The excavated soil was disposed of after proper treatment.

To determine the vertical extent of the plume, Intersil installed an intermediate water-bearing zone monitoring well near and downgradient from the source area and collected soil borings to a depth about 87 feet. Intersil analyzed all soil samples using EPA method 8240, an appropriate method used to detect all VOCs (aromatic and purgeable hydrocarbons). Based on the analytical results, pollutants at the site did not migrate further than 19 feet in depth.

11. In 1991, Intersil also performed an additional soil remedial investigation to delineate the distribution of VOCs at the site to propose an appropriate final cleanup plan. At this time, EPA method 8010 was used to analyze purgeable hydrocarbons. Chemical data from 32 vadose zone soil samples indicated that total purgeable hydrocarbon concentrations were less than 1 ppm, except for one sample of 1.3 ppm. These concentrations did not indicate an additional source area, and therefore, no soil remediation was recommended.
12. Groundwater Investigation and Remediation Intersil initiated groundwater investigation at the site in 1982. The primary VOCs detected in groundwater samples were 1,2-DCE, TCE, Freon 113, and vinyl chloride. Other VOCs generally detected less frequently and at the lower concentrations include 1,2-DCB, xylenes, dichlorotrifluoroethane, and PCE. The only semi-

Order No. 93-151  
Final Site Cleanup Requirements

volatile compound detected was 1,2,4-trichlorobenzene (1,2,4-TCB).

From 1985 through 1987, Intersil conducted extensive remedial investigation to characterize the site and determine on-site and off-site vertical and lateral migration of the pollutants in groundwater. Investigation results confirmed high VOC concentrations in shallow groundwater in two locations - at the eastern portion of the Intersil site and at the western portion of the adjacent Western Microwave facility. The lateral extent of the plume was bounded by non-detectable analyses. Monitoring data indicated that the intermediate water-bearing zone has not been impacted with VOCs. Quarterly monitoring is still ongoing. There are ten shallow and one intermediate groundwater monitoring wells, three operating and one standing-by extraction wells, and three piezometers at the site. Intersil routinely submits a quarterly groundwater monitoring report and an NPDES self-monitoring report.

13. **Evaluation of Groundwater Interim Remedial Measures** Intersil initiated interim remedial measures for contaminated shallow groundwater in 1987. The interim remedial system consists of three on-site shallow groundwater extraction wells and an air stripper followed by carbon adsorption. This interim system was implemented to reduce VOC concentrations and to provide hydraulic control over the plume. In 1991, Intersil also installed an additional off-site extraction well to enhance further VOC removal in the off-site groundwater. After one year in operation, Intersil stopped pumping this off-site well because off-site pumping was not effective in improving off-site groundwater quality. Based on the distribution of chemicals in groundwater, the capture zone of the extraction system includes adjacent VOC source areas.

Since the extraction and treatment system began operating at the site, VOC concentrations decreased significantly in off-site areas and in areas away from the eastern property boundary. VOC concentrations only declined slightly on the south eastern portion of the property boundary. As of the September 1992 report, the extraction system extracted over 24 million gallons of contaminated water and removed about 285 pounds of VOCs. Generally, the interim remedial system has been very effective in containing the plume, but it has not been as efficient as expected in restoring aquifer quality due to off-site sources.

14. Adjacent Sites

**Former Western Microwave Facility:** This site is located at 1271 Reamwood Avenue, adjacent to and east of the Intersil site. Western Microwave discovered a VOC release at its site in 1985. The indicator chemicals are PCE and its breakdown products, TCE and cis- and trans-1,2-DCE, and xylenes. VOC concentrations are substantially higher in soil and in groundwater at the Western Microwave site than at the Intersil site. Recent soil and shallow groundwater investigations have found up to 185 ppm in soil and up to 78,000 ppb in groundwater of total purgeable chlorinated hydrocarbons along the western property boundary of the Western Microwave site. These results were consistent with previous investigation data performed at the site. Sobrato (the owner) conducted partial soil removal in 1991. More source removal and groundwater remediation is needed. The Board adopted Site Cleanup Requirements for the 1271 Reamwood site in May 1993.

**Former Lockheed Facility:** Another VOC release also occurred at 1235 Elko Drive, upgradient of the Intersil and Western Microwave sites. The source was a leakage of an underground sump. Soil and groundwater underneath the site were impacted by contaminants, primarily TCE and 1,2-DCE, above California drinking water standards. Lockheed excavated and removed the contaminated soil and characterized the site. Lockheed also submitted a workplan for shallow groundwater interim remedial measures in September 1993. This site is not under Regional Board order.

15. State Water Resources Control Board Resolutions

**State Board Resolution 68-16:** On October 28, 1968, the State Board adopted Resolution No. 68-16, "Statement of Policy with Respect to Maintaining High Quality Waters in California." This policy calls for maintaining the existing high quality of State waters unless it is demonstrated that any change would be consistent with the maximum public benefit and not unreasonably affect beneficial uses. This is based on a Legislative finding, contained in Section 13000, California Water Code, which states in part that it is State policy that "waters of the State shall be regulated to attain the highest water quality which is reasonable." The original discharge of wastes to the groundwater at this site was in violation of this policy.

**State Board Resolution 88-63:** On May 19, 1988, the State Board adopted Resolution 88-63, "Sources of Drinking Water."

Order No. 93-151  
Final Site Cleanup Requirements

This resolution states that, with certain exceptions, surface and ground waters of the State are considered to be suitable, or potentially suitable, for municipal or domestic water supply.

16. **Water Quality Control Plan** The Board adopted a revised Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) on December 17, 1986, and the State Board approved it on May 21, 1987. The Basin Plan contains water quality objectives and beneficial uses for South San Francisco Bay and contiguous surface and ground waters.

The existing and potential beneficial uses of the groundwater underlying and adjacent to the facility include:

- a. Industrial process water supply
- b. Industrial service water supply
- c. Municipal and Domestic water supply
- d. Agricultural water supply.

The Board amended the Basin Plan on September 16, 1992 (to implement two statewide plans) and again on October 21, 1992 (to formalize groundwater protection and management policies). The latter amendment describes how groundwater cleanup standards should be established. The primary objective is to maintain background, but standards should be set no higher than maximum contaminant levels (MCLs), and may be set lower based on a site-specific risk assessment. The Board will consider several factors when setting cleanup standards: cost and effectiveness of cleanup alternatives, time to achieve cleanup, and pollutants toxicity, mobility, and volume.

17. **Summary of Risk Assessment** The shallow groundwater underneath the site is not currently used for domestic supply. Nonetheless, the risk assessment assumed that the shallow groundwater beneath the site would in future be used as a domestic water supply. Two scenarios were used to address this issue. Scenario 1 evaluated current site conditions using the most recent maximum groundwater VOC concentrations. Scenario 2 evaluated future conditions using final cleanup goals (MCLs). The assessment determined the primary chemicals of interest and their toxicity and identified potential exposure pathways for both scenarios. Then, the assessment computed risks for carcinogenic and non-carcinogenic chemicals in the groundwater, and compared them to the EPA recommended risk range.

**Toxicity Classification for Chemicals of Interest:** Fourteen

Order No. 93-151  
Final Site Cleanup Requirements

compounds have been consistently detected in shallow groundwater beneath the site. These compounds are: chloroform, 1,2-dichlorobenzene (1,2-DCB), 1,3-DCB, 1,1-DCE, cis-1,2-DCE, dichlorotrifluoroethane, ethylbenzene, Freon 113, PCE, 1,2,4-TCB, 1,1,1-TCA, TCE, vinyl chloride, and xylenes. Trans-1,2-DCE, TCE, vinyl chloride, and Freon 113 were widely distributed and found at significantly high concentrations.

Four of the indicator chemicals are classified as carcinogens: chloroform, PCE, TCE, and vinyl chloride. Based on EPA's classification, vinyl chloride is a class "A" carcinogen (sufficient human evidence). Chloroform, PCE and TCE are class "B2" carcinogens (inferring probable human carcinogen, with inadequate human evidence and sufficient evidence from animal experiments). 1,1-DCE is a class "C" carcinogen (possible human carcinogen, limited evidence of carcinogenicity in animals with inadequate human data). For dichlorotrifluoroethane, no classification was available. The rest of the compounds such as 1,2-DCB, 1,3-DCB, cis-1,2-DCE, ethylbenzene, Freon 113, 1,2,4-TCB, 1,1,1-TCA, and xylenes are non-carcinogens (class "D").

**Exposure Assessment:** Under current use of the site, there appear to be no complete exposure pathways. The level of contaminants in the shallow aquifer are greater than drinking water standards; however, the shallow aquifer is currently not being used for drinking water. The deeper aquifer that is used for drinking water has not been impacted by VOCs.

The assessment assumed that a hypothetical domestic well would be screened in the shallow aquifer for both scenarios - current and future uses. Two potential pathways of exposure were recognized to evaluate the risk assessment. The first hypothetical pathway is the use of shallow groundwater underneath the site as a source of drinking water. Quantification of exposure from this pathway assumes ingestion as an exposure route. The second hypothetical pathway is exposure to VOCs vaporized during showering and cooking by inhalation exposure route. Both exposure routes assume exposure of drinking 2 liters of water per day by a 70-kilogram person (U.S. EPA, 1988 and 1989).

**Baseline Risk:** Quantified public health total risks were determined using the estimated potential chemical intake from the hypothetical drinking water well and inhalation of vapor that were computed utilizing the estimated exposure point concentrations. For Scenario 1 (using the current concentration), the excess cancer risk was estimated to be 2.0

Order No. 93-151  
Final Site Cleanup Requirements

$\times 10^{-3}$ , or two excess cancer cases in a population of 1,000. EPA's recommended risk range for carcinogens is  $10^{-4}$  to  $10^{-6}$ , or one in 10,000 to one in 1,000,000 excess cancers in an exposed population.

Using a similar approach for the non-carcinogenic VOCs, a total hazard index (HI) was determined to be 2.5, with cis-1,2-DCE alone accounting for most of the HI. EPA recommends that the total HI for a site not exceed 1.0.

The baseline public health evaluation (BPHE) did not identify soil as an exposure medium. The potential sources of VOCs in soil have been removed in the vicinity of the former neutralization system, chemical storage, and chemical handling areas. No complete exposure pathway exists unless utility workers come in contact with the contaminated groundwater. Intersil also submitted a report labelled "Supplemental Health Risk Evaluation" on November 12, 1993. This report used a utility worker scenario that assumed exposure of utility workers to contaminated soil, air and groundwater at about six feet below ground surface. The analysis revealed insignificant potential excess cancer risk and HI to utility workers.

A deed restriction is appropriate to prohibit the use of the shallow groundwater underneath the site as a source of drinking water until cleanup standards are achieved.

The BPHE did not also identify indicator chemicals in the air, with the exception of the those chemicals emitted to the air during groundwater treatment.

**Post-Remediation Risk:** Since the estimated risks from Scenario 1 exceeded EPA's recommended risk range, the assessment considered drinking water standards (MCLs) of VOCs as a final cleanup goal for all pollutants at the site. This approach would protect future beneficial uses of the shallow groundwater underneath the facility. Scenario 2 evaluates the potential health risk for use of shallow groundwater at the site as a domestic, potable water supply once MCLs are achieved. For the carcinogenic chemicals, the excess cancer risk predicted by this analysis is about  $1 \times 10^{-5}$ , or one in 100,000 or less. This cancer risk level lies within the EPA's recommended risk range. Likewise, the total HI for all non-carcinogenic compounds was found to be 0.933, slightly below 1.0.

**Ecological Assessment:** In September 1990, Intersil performed



Order No. 93-151  
Final Site Cleanup Requirements

an ecological risk assessment focused on sensitive species in the Baylands Park area to the potential for adverse environmental impacts posed by VOCs in shallow groundwater. The Sunnyvale-Baylands County Park located about 1000 feet north (downgradient) of the site is the closest habitat for important native organisms. The analysis assumed that the total mass of VOCs contained within the shallow aquifer from the site was allowed to reach the marsh unimpeded by any remedial activities. Under this worst-case assumption, no adverse ecological effects are expected for the marsh.

18. **Evaluation of Remedial Technologies** Intersil developed and evaluated a list of possible alternatives for remediating the contaminated shallow groundwater underneath the 1276 Hammerwood Avenue site. The screening of technologies was based on their applicability to site characteristics, on the properties of the chemicals, and on reliability and performance of treatment technologies. The remaining technologies such as a) groundwater extraction and treatment (existing interim remedial measure), b) slurry wall and in-situ treatment wall, c) slurry wall, dewatering, and vapor extraction, and d) slurry wall and enhanced biodegradation were then further evaluated on the basis of environmental and public health impacts and cost analysis. Final detailed analysis involved implementability, effectiveness, and total project costs. This evaluation followed the approach outlined in EPA's National Contingency Plan (NCP) (see 40 CFR part 300).
19. **Remedial Actions** In accordance with the site Waste Discharge Requirements (Order No. 86-78), Intersil submitted two reports: a "Final Remedial Action Plan" (FRAP) and a "FRAP Addendum" in 1989 and 1990, respectively. Both of these reports recommended expansion of the existing groundwater extraction treatment system. In January 1993, Intersil submitted another report, "Revised Final Remedial Action Plan" (RFRAP) to replace the two former FRAP reports. The RFRAP recommended an innovative technology "Slurry Wall and In-Situ Treatment Wall" as a final remedy for the site. Based on a comparison of implementability, site use impacts, operational and maintenance requirements, effectiveness and reliability, and costs, this Order provides the "Slurry Wall and In-Situ Treatment Wall" as a final cleanup remedy, and a "Slurry Wall and Enhanced Biodegradation" as a contingent remedy.

Intersil's proposed final remedial actions are as follows:

- a) The selected final remedy, in-situ treatment wall, uses an

Order No. 93-151  
Final Site Cleanup Requirements

innovative technology to passively treat chlorinated organics in shallow groundwater. The treatment wall is made of a permeable in-situ reactive wall that contains a mixture of sand and iron filings constructed along the eastern portion of the downgradient (northern) edge of the site. A low-permeability slurry wall will also be installed east, west, and south of the in-situ treatment wall. The slurry wall would contain and direct the flow of VOC-affected shallow groundwater beneath the site through the permeable reactive wall. The reactive wall would provide passive treatment to degrade VOCs and prevent high VOC concentrations from migrating further. Like the present interim remedial measures, this remedy will take decades to achieve cleanup standards. However, using the new remedy, no above-ground structures are required and economic use of the site would be restored.

- b) The in-situ treatment wall is a new technology, and it is the first treatment system of its kind to be implemented, at least in the San Francisco Bay Region. Bench-scale and pilot-scale studies using site groundwater were performed. The results indicate that a properly designed treatment wall would provide complete degradation of chlorinated organics as contaminated groundwater migrated through it. The by-product components include salts of chloride ions, ethane and ethylene, which are non-toxic.
- c) Four additional monitoring wells will be installed within the treatment wall, on its downgradient side, and at least one additional monitoring well will be installed in the in-situ treatment area. Periodic groundwater monitoring would be performed to monitor the performance of the treatment system.
- d) The net present worth of the selected remedy is about \$2.9 million, compared to \$7.8 million net present worth of groundwater extraction treatment system. Both values are computed based on 30-years life time and 3-percent discount rate as used by the National Contingency Plan (NCP).
- e) A "Slurry Wall and Enhanced Biodegradation" is recommended as a contingency alternative. This remedy is also a new one, and it will be applicable if the selected remedy fails to meet cleanup standards at the site. The slurry wall would enhance the natural anaerobic conditions that favor biodegradation by isolating groundwater beneath the site. Injecting additives such as glucose and other food sources to anaerobic micro-organisms in groundwater to further enhance biodegradation is not being considered at this time because of its experimental

Order No. 93-151  
Final Site Cleanup Requirements

limitations, but will be considered in the future as proven technologies become available.

20. **Basis for Cleanup Standards** Cleanup standards for groundwater differ between the eastern portion of the site and elsewhere (remainder of the site and off-site) for reasons explained below. The eastern side of the site is defined as the area bounded by the slurry wall. Off-site refers to elsewhere outside the in-situ area including the western portion of the site and the larger area north and down-gradient from 1276 Hammerwood Avenue.

- a. **On-site (Eastern Side) Groundwater:** On-site total dissolved solids (TDS) concentrations are high, averaging 2,800 mg/l over the last five years. This level, while exceeding the Title 22 limiting concentration established for municipal water supply, is lower than the 3,000 mg/l TDS maximum for potential sources of drinking water (State Board resolution 88-63 and Regional Board resolution 89-39). Therefore, municipal supply is a potential beneficial use of on-site groundwater. At a minimum, California and U.S. EPA maximum contaminant levels (MCLs) should be met. Meeting MCLs will result in an acceptable excess risk, as described in Finding 17. Cleanup of groundwater below MCL concentrations may be technically impractical due to the physical and chemical behavior of VOCs in aquifers. Thus, MCLs are acceptable to meet the intent of State Board resolution 68-16.
- b. **On-site (Remainder) Groundwater:** Groundwater underneath the remainder of the site also has high TDS concentrations. No cleanup standards are necessary for the remainder of the site for the following reasons:
- i) Total VOC concentration measured about 265  $\mu\text{g/l}$  on the remainder of the site versus 16,000  $\mu\text{g/l}$  on the eastern (the source area) side of the Intersil site. Neither the current nor the expected VOC concentrations on the western portion of the site pose a threat to deeper aquifers. The municipal supply is not a potential beneficial use of this shallow groundwater either. The risk assessment also identified no other exposure pathways for this western side of the site. Therefore, no groundwater cleanup standards are needed for the remainder of the site.
- ii) On-site shallow groundwater has very marginal water

Order No. 93-151  
Final Site Cleanup Requirements

quality. It barely meets the definition of potential drinking water due to high TDS and naturally occurring mineral salts. Future use for domestic water supply is highly unlikely, due to salinity and land use trends.

- iii) Proven groundwater treatment alternatives are very limited. The Board should encourage dischargers to try innovative technologies, especially in areas where beneficial use of groundwater is unlikely. If the reactive-wall technology works here, there will be a region-wide benefit, by expanding the options available at other sites.
  - iv) The incremental construction cost to extend the reactive/slurry to include the western side of the site will be about \$1.3 million, which is about 44.83 % higher than the estimated cost for the proposed final remedy. This cost is uneven to the water quality benefits that would be obtained because VOC concentrations are two orders of magnitude lower at the western portion of the site than at the eastern side of the site.
- c. **Off-site (North & Down-gradient) Groundwater:** Off-site TDS concentrations are still higher than on-site concentrations since the down-gradient area is closer to San Francisco Bay. TDS concentration in off-site wells averaged 3,093 mg/l over the last five years, exceeding both the Title 22 limiting concentration of 1,000 mg/l and the 3,000 mg/l TDS maximum for potential sources of drinking water. In addition, the off-site area is only a few feet above sea level and may be subject to intrusion of salt water to shallow groundwater. Besides, the site and its environs are zoned for commercial and light-industrial use, and this use is unlikely to change in the future. Conversion to residential use is even less likely.

The municipal supply is not a potential beneficial use of off-site groundwater, and MCLs do not apply. Given the thickness and low permeability of the aquitard underlying off-site shallow groundwater and given current and expected VOC concentrations in off-site groundwater, no cleanup standards are needed to protect deeper aquifers. The risk assessment also identified no other exposure pathways for off-site groundwater. Therefore, no cleanup standards are necessary for off-site groundwater.

Order No. 93-151  
Final Site Cleanup Requirements

21. The discharger has caused or permitted, and threatens to cause or permit, waste to be discharged or deposited where it is or probably will be discharged to waters of the State and creates or threatens to create a condition of pollution or nuisance.
22. This action is an order to enforce the laws and regulations administered by the Board. This action is categorically exempt from the provisions of the California Environmental Quality Act (CEQA) pursuant to Section 15321 of the Resources Agency Guidelines.
23. The Board has notified the discharger and interested agencies and persons of its intent under California Water Code Section 13304 to prescribe Site Cleanup Requirements for the discharge and has provided them with the opportunity for a public hearing and an opportunity to submit their written views and recommendations.
24. The Board, in a public meeting, heard and considered all comments pertaining to the discharge.

**IT IS HEREBY ORDERED**, pursuant to Section 13304 of the California Water Code, that the discharger shall cleanup and abate the effects described in the above findings as follows:

**A. PROHIBITIONS**

1. The discharge of wastes or hazardous materials in a manner which will degrade water quality or adversely affect the beneficial uses of the waters of the State is prohibited.
2. Further significant migration of pollutants through subsurface transport to waters of the State is prohibited.
3. Activities associated with the subsurface investigation and cleanup which will cause significant adverse migration of pollutants are prohibited.

**B. SPECIFICATIONS**

1. The storage, handling, treatment or disposal of soil or groundwater containing pollutants shall not create a nuisance as defined in Section 13050(m) of the California Water Code.
2. Additional characterization of the pollutant plume may be

Order No. 93-151  
Final Site Cleanup Requirements

required, should monitoring results show evidence of further plume migration beyond that already identified, or new evidence of soil contamination, .

3. All on-site (eastern side) monitoring wells, as defined in Finding 20.a., shall be used to determine if cleanup standards have been met; the wells used are determined by the Self-Monitoring Program (SMP) established under this Order.
4. **Cleanup Standards:** Final groundwater cleanup standards given in Table 1 below shall be met at all on-site (eastern side) wells.

Table 1 On-site (Easter Side) Groundwater Cleanup Standards ( $\mu\text{g/l}$ )			
Chemical	California Primary MCL	U.S. EPA Primary MCL	Cleanup Standards
Chloroform	100	100	100
1,2-DCB	-	600	600
1,3-DCB	-	600	600
1,1-DCE	6	7	6
Cis-1,2-DCE	6	70	6
Ethylbenzene	680	700	680
Freon 113	1,200	-	1,200
PCE	5	5	5
1,2,4-TCB	-	70	70
1,1,1-TCA	200	200	200
TCE	5	5	5
Vinyl Chloride	0.5	2	0.5
Xylenes	1,750	10,000	1,750

5. **Future Changes to Cleanup Standards:** If new information indicates cleanup standards cannot be attained or can be surpassed, the Board will decide if further final cleanup actions, beyond those completed, shall be implemented at the site. If changes in health criteria, administrative

Order No. 93-151  
Final Site Cleanup Requirements

requirements, site conditions, or remediation efficiency occur, the discharger will submit an evaluation of the effects of these changes on cleanup standards as defined in Specification B.4.

6. The existing groundwater extraction and treatment system shall be maintained and kept operational until such time as construction activities would require removal and destruction of wells and/or slurry wall and in-situ treatment wall is completed in accordance with the provisions of this Order.
7. Pursuant to Section 13304 of the California Water Code, the discharger is hereby notified that the Board is entitled to, and may seek reimbursement for all reasonable costs actually incurred by the Board to investigate unauthorized discharges of waste and to oversee cleanup of such waste, abatement of the effects thereof, or other remedial action, as required by this Order. The discharger shall reimburse the Board upon receipt of a billing statement for those costs.

C. PROVISIONS

1. The discharger shall submit to the Board acceptable monitoring program reports containing results of work performed according to the attached Self-Monitoring Program.
2. The discharger shall comply with the Prohibitions and Specifications above immediately except as modified by the time schedule and tasks listed below.

a. **COMPLETION DATE: MARCH 1, 1994**

**TASK 1: DESIGN FOR SLURRY WALL AND IN-SITU TREATMENT WALL:** Submit a technical report acceptable to the Executive Officer which contains the design for the in-situ treatment wall and associated slurry walls for the contaminated shallow groundwater underneath the site. This document shall include, but need not be limited to, rationale for wall location, a map of the slurry wall and in-situ treatment wall configuration, the estimated area and depth of the in-situ treatment system, the estimated velocity of the groundwater as it approaches the treatment wall, and the residence time of the system, and how the

Order No. 93-151  
Final Site Cleanup Requirements

performance of the system will be evaluated. The document should also include a schedule for equipment acquisition, system construction, and implementation.

b. **COMPLETION DATE: August 1, 1994**

**TASK 2: IMPLEMENTATION OF SLURRY WALL AND IN-SITU TREATMENT WALL:** Submit a report acceptable to the Executive Officer which documents full implementation of the desired system and shut-down of the groundwater extraction and treatment system..

The Executive Officer may modify the completion date of Task 2 if the discharger demonstrates to the satisfaction of the Executive Officer that additional time is necessary to complete the design due to delays outside the reasonable control of the discharger, such as investigation or remedial work related to discharges by other parties.

c. **INSTITUTIONAL CONSTRAINTS**

1) **COMPLETION DATE: MARCH 1, 1994**

**TASK 3: PROPOSE CONSTRAINTS:** Submit a technical report acceptable to the Executive Officer documenting procedures to be implemented by the discharger, including a deed restriction prepared and filed by Sobrato (the owner) prohibiting the use of the upper aquifer groundwater as a source of drinking water and protecting the integrity of the slurry wall/reactive wall. Constraints shall remain in effect until groundwater cleanup standards have been achieved and pollutant levels have stabilized in on-site aquifers.

2) **COMPLETION DATE: 60 days after Executive Officer's approval of Task 3**

**TASK 4: IMPLEMENT CONSTRAINTS:** Submit a technical report acceptable to the Executive Officer documenting that the proposed and approved constraints have been implemented.

d. **COMPLETION DATE: NOVEMBER 17, 1998**



Order No. 93-151  
Final Site Cleanup Requirements

**TASK 5: FIVE-YEAR STATUS REPORT AND EFFECTIVENESS EVALUATION:** Submit a technical report acceptable to the Executive Officer containing the results of any additional investigation; an evaluation of the effectiveness of installed final cleanup measures and cleanup costs; additional recommended measures to achieve final cleanup objectives and standards, if necessary; a comparison of previous expected costs with the costs incurred and projected costs necessary to achieve cleanup objectives and standards; and the tasks and time schedule necessary to implement any additional final cleanup measures. If cleanup standards in this Order have not been achieved on-site and area not expected to be achieved through continued in-situ treatment system, this report shall also contain an evaluation addressing whether it is technically practicable to achieve the cleanup standards, and if so, a proposal for procedures to do so.

- e. **COMPLETION DATE:** 90 days after request made by the Executive Officer

**TASK 6: EVALUATION OF NEW HEALTH CRITERIA:** Submit a technical report acceptable to the Executive Officer which contains an evaluation of how the final plan and cleanup standards would be affected, if the concentrations as listed in Specification B.4. change as a result of promulgation of drinking water standards, maximum contaminant levels or action levels or other health based criteria.

- f. **COMPLETION DATE:** 90 days after request made by the Executive Officer

**TASKS 7: EVALUATION OF NEW TECHNICAL INFORMATION:** Submit a technical report acceptable to the Executive Officer which contains an evaluation of new technical and economic information which indicates that cleanup standards or cleanup technologies in some areas may be considered for revision. Such technical reports shall not be required unless the Executive Officer or the Board determines that such new information indicates a reasonable possibility that the Order may need to be changed under the criteria described in Specification B.4.

Order No. 93-151  
Final Site Cleanup Requirements

3. The submittal of technical reports evaluating interim and final remedial measures will include a projection of the cost, effectiveness, benefits, and impact on public health, welfare, and environment. These evaluations should be consistent with the guidance provided by Subpart F of the NCP (40 CFR part 300); Section 25356.1 (c) of the California Health and Safety Code; CERCLA guidance documents; and shall be consistent with the State Water Resources Control Board's Resolution No. 68-16, "Statement of Policy with Respect to Maintaining High Quality of Waters in California."
4. If the discharger is delayed, interrupted or prevented from meeting one or more of the completion dates specified in this Order, the discharger shall promptly notify the Executive Officer, and the Board may consider revision to this Order for such delays that are beyond the control of the discharger.
5. Technical status reports on compliance with the Prohibitions, Specifications, and Provisions of this Order shall be submitted quarterly to the Board commencing on January 31, 1994, and covering the previous calendar quarter. Reports shall be submitted on a quarterly basis, until one year after implementation of the "Slurry Wall and In-Situ Treatment Wall" treatment system. The technical reports may then be submitted semi-annually after the second and fourth quarters thereafter, or as required by the Executive Officer. These reports shall consist of: (1) a summary of work completed since submittal of the previous report and work projected to be completed by the time of the next report, (2) identification of any obstacles which may threaten compliance with the schedule of this Order and what actions are being taken to overcome these obstacles, and (3) include, in the event of non-compliance with any Provision or Specification of this Order, written notification which clarifies the reasons for non-compliance and which proposes specific measures and a schedule to achieve compliance. This written notification shall identify work not completed that was projected for completion, and shall identify the impact of non-compliance on achieving compliance with the remaining requirements of this Order.

These reports shall also identify any problems with or changes in the "Slurry Wall and In-Situ Treatment Wall" treatment system. Additionally, the reports shall

Order No. 93-151  
Final Site Cleanup Requirements

include, but need not be limited to, updated water table and piezometric surface maps and plume maps for all affected water bearing zones, and appropriately scaled and detailed base maps showing the location of all monitoring wells and identifying adjacent facilities and structures. These reports may be combined with quarterly SMRs required per Provision C.1.

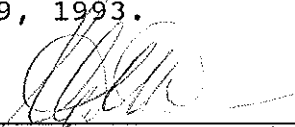
6. On an annual basis beginning with the reports due January 31, 1994 or as required by the Executive Officer, the status report shall include, but need not be limited to, an evaluation of the progress of cleanup measures. A summary of monitoring and sampling data shall also be included in the annual report which can be part of the fourth quarter report.
7. The discharger shall submit technical reports acceptable to the Executive Officer containing revised Quality Assurance project Plans, Site Safety Plans, and Site Sampling Plans, if requested by the Executive Officer.
8. All hydrogeological plans, specification, reports, and documents shall be signed by or stamped with the seal of a registered geologist, engineering geologists, or professional engineer.
9. All samples shall be analyzed by State certified laboratories or laboratories accepted by the Board using approved EPA methods for the type of analysis to be performed. All laboratories shall maintain quality assurance/quality control records for Board review.
10. The discharger shall maintain in good working order, and operate, as efficiently as possible, any facility or control system installed to achieve compliance with the requirements of this Order.
11. The discharger shall provide copies of all correspondence, reports, and documents pertaining to compliance with the Prohibitions, Specifications, and Provisions of this Order to the Santa Clara Valley Water District. The discharger shall also provide copies of cover letters, title page, table of contents and the executive summaries of above compliance report - except for the annual progress reports, Proposal for Groundwater Remediation, and Proposal for Soil Remediation which shall be submitted in full to the following agencies.

Order No. 93-151  
Final Site Cleanup Requirements

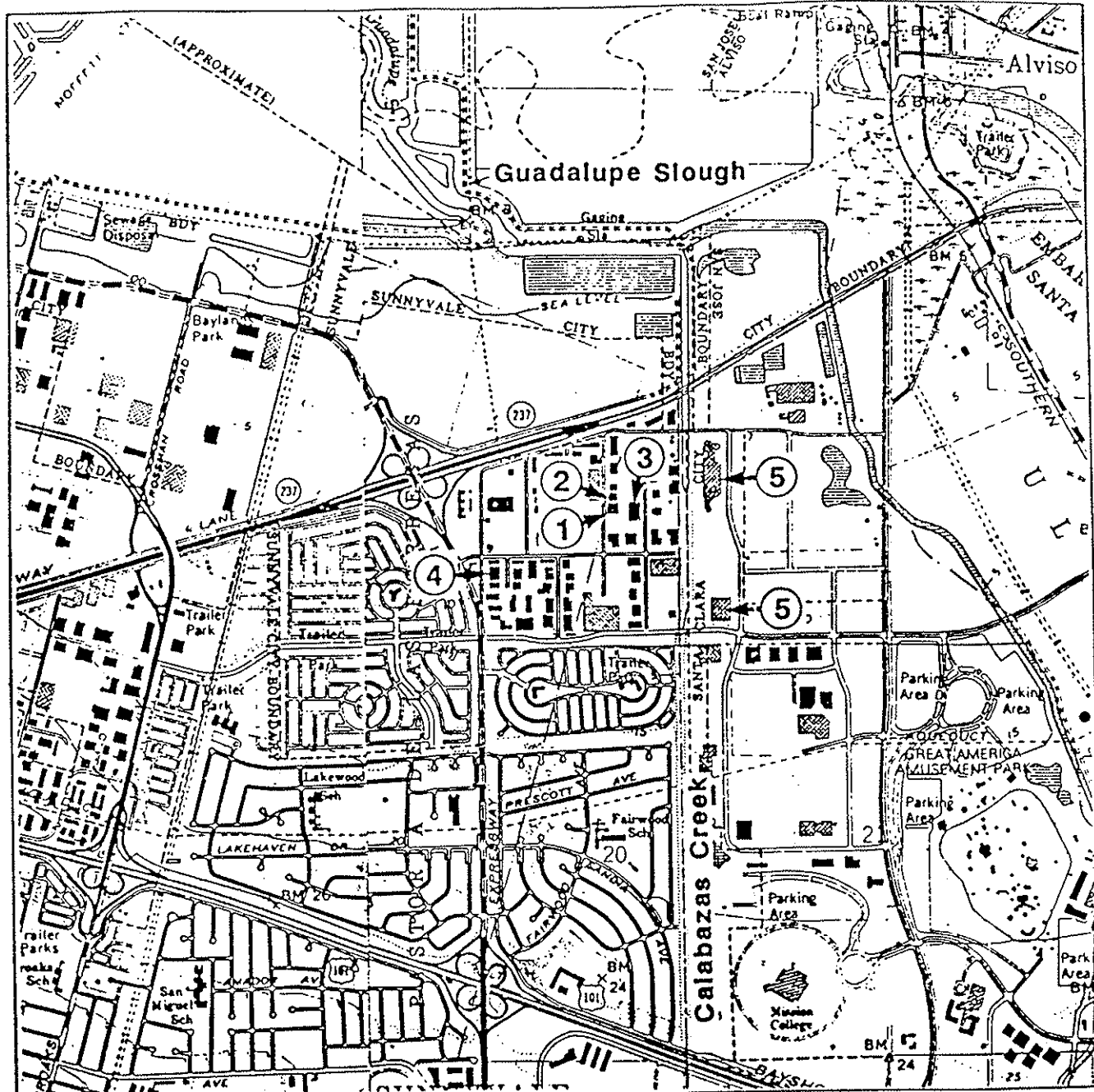
- a. Santa Clara County Health Department
  - b. City of Sunnyvale Department of Public Safety
  - c. California EPA/DTSC Site Mitigation Branch
12. The discharger shall permit the Board or its authorized representative, in accordance with Section 13267(c) of the California Water Code:
- a. Entry upon premises in which any pollution sources exist, or may potentially exist, or in which any required records are kept, which are relevant to this Order.
  - b. Access to copy any records required to be kept under the terms and conditions of this Order.
  - c. Inspection of any monitoring equipment or methodology implemented in response to this Order.
  - d. Sampling of any groundwater or soil which is accessible, or may become accessible, as part of any investigation or remedial action program undertaken by the discharger.
13. If any hazardous substance is discharged in or on any waters of the State, or discharged and deposited where it is, or probably will be discharged in or on any waters of the State, the discharger shall report such discharge to this Board, at (510) 286-1255 on weekdays during office hours from 8:00 a.m. to 5:00 p.m., and to the Office of Emergency Services at (800) 852-7550 during non-office hours. A written report shall be filed with the Board within five working days and shall contain information relative to: the nature of the waste or pollutant, quantity involved, duration of incident, cause of spill, estimated size of affected area, nature of effects, corrective measures that have been taken or planned, and schedule of these activities, and persons, notified.
14. The discharger shall file a report on any changes in site occupancy and ownership associated with the facility described in this Order.
15. The Board will review this Order periodically and may revise the requirements when necessary.
16. Board Order No. 86-78 is hereby rescinded.

Order No. 93-151  
Final Site Cleanup Requirements

I, Steven. R. Ritchie, Executive Officer, do hereby certify that the foregoing is a full, true and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on November 19, 1993.

  
\_\_\_\_\_  
Steven R. Ritchie  
Executive Officer

Attachments:     Figure 1 - Parcel Map with Adjacent Sites  
                         Groundwater Self-Monitoring Program



1. Former Intersil Facility
2. Bay Area Data Supply, Inc.
3. Western Microwave
4. Precision Media Corporation
5. Dysan Corporation

Base map from: U.S. Geologic Survey, 7 1/2' topographic series, Milpitas Quadrangle.

0 2000 Feet



LOCATION MAP  
Former Intersil Facility  
Sunnyvale, California

Figure  
1

Project No.  
1165A-0700

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD  
SAN FRANCISCO BAY REGION

GROUNDWATER SELF-MONITORING PROGRAM

FOR

Intersil, Inc.

1276 Hammerwood Avenue Site

Sunnyvale, Santa Clara County

ORDER NO. 93-151

Adopted on November 19, 1993

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD  
SAN FRANCISCO BAY REGION

INTERSIL, INC.  
1276 Hammerwood Avenue Site

GROUNDWATER SELF-MONITORING PROGRAM

A. GENERAL

Reporting responsibilities of waste dischargers are specified in Sections 13225(a), 13267(b), 13283, 13383 and 13387(b) of the California Water Code and this Regional Board's Resolution No. 73-16.

The principal purposes of a monitoring program by a waste discharger, also referred to as self-monitoring program (SMP), are: (1) to document compliance with waste discharge requirements and prohibitions established by this Regional Board, (2) to facilitate self-policing by the waste discharger in the prevention and abatement of pollution arising from waste discharge, (3) to develop or assist in the development of effluent or other limitations, discharge prohibitions, national standards of performance, pretreatment and toxicity standards, and other standards, and (4) to prepare water and waste water quality inventories.

B. SAMPLING AND ANALYTICAL METHODS

Sample collection, storage, and analyses shall be performed according to the EPA Method 8000 series in "Test Methods for Evaluating Solid Wastes, Physical/Chemical methods," dated November 1986; or other methods approved and specified by the Executive Officer of this Regional Board.

C. REPORTS TO BE FILED WITH THE REGIONAL BOARD

1. Violation of Requirements

In the event the discharger is unable to comply with the conditions of the site cleanup requirements and prohibitions due to:

- a. maintenance work, power failures, or breakdown of waste treatment equipment, or
- b. accidents caused by human error or negligence, or
- c. other causes, such as acts of nature, or
- d. poor operation or inadequate system design,



the discharger shall notify the Regional Board office by telephone as soon as he or his agents have knowledge of the incident and confirm this notification in writing within five working days of the telephone notification. The written report shall include time, date, and person notified of the incident. The report shall include pertinent information explaining reasons for the noncompliance and shall indicate what steps were taken to prevent the problem from recurring.

2. The discharger shall file a written technical report to be received at least 30 days prior to advertising for bid (or 60 days prior to construction) on any construction project which would cause or aggravate the discharge of waste in violation of requirements; said report shall describe the nature, cost, and scheduling of all action necessary to preclude such discharge.

3. Self-Monitoring Reports (SMR)

SMRs shall be filed quarterly and are due one month after the end of the calendar quarter.

The discharger shall notify Regional Board staff by telephone within fourteen days of receiving laboratory analytical results if (i) a chemical is detected which has not been detected previously, or (ii) if the concentration of any chemical in any well is at least one order of magnitude greater than detected the previous quarter.

The next SMR is due January 31, 1994. The SMR shall be comprised of the following:

- a. Letter of Transmittal:

A letter from the discharger transmitting the SMR should accompany each report. Such a letter shall include a discussion of requirement violations found during the reporting period and actions taken or planned for correcting any requirement violations. If the discharger has previously submitted a detailed time schedule for correcting requirement violations, a reference to this correspondence will be satisfactory. Monitoring reports and the letter transmitting reports shall be signed by a principal executive

officer or a duly authorized representative of that person.

The letter shall contain a statement by the official, under penalty of perjury, that to the best of the signer's knowledge the report is true and correct.

b. Results of Analyses and Observations

- (1) Results from each required analysis and observation shall be submitted in the self-monitoring regular reports. Results shall also be submitted for any additional analyses performed by the dischargers at the specific request of the Board. Quarterly water level data shall also be submitted in the report.
- (2) The SMR shall include the results of any aquifer tests conducted.
- (3) The SMR shall include a discussion of unexpected operational changes which could affect performance of the in-situ treatment system, such as groundwater velocity and gradient fluctuations.
- (4) The SMR shall also identify the analytical procedures used for analyses either directly in the report or by reference to a standard plan accepted by the Executive Officer. Any special methods shall be identified and should have prior approval of the Board's Executive Officer.
- (5) The discharger shall describe in the SMR the reasons for significant increases in a pollutant concentration at a well. The description shall include:
  - (a) the source of the increase,
  - (b) how the discharger determined or will investigate the source of the increase, and
  - (c) what source removal measures have been completed or will be proposed.

- (6) Original lab results shall be retained and shall be made available for inspection for six years after origination or until after all continuing or impending legal or administrative actions are resolved.
- (7) The SMR shall include a summary of work completed since submittal of the previous report, design specifications if applicable, and work projected to be completed by the time of the next report.
- (8) The SMR shall include tabulated results of self-monitoring water quality sampling analyses for all wells using appropriate analytical methods. Each report shall include updated isoconcentration maps of VOCs in groundwater.
- (9) The SMR shall include updated water table and piezometric surface maps, based on the most recent water level measurements for all affected water-bearing zones for all on-site and off-site wells. Interpretations of the data shall be discussed.
- (10) A map or maps shall accompany the SMR showing all sampling locations and plume contours for the predominant chemical(s), or other indicator chemicals upon request by the Executive Officer.
- (11) The annual report may be combined with the fourth quarter regular report and shall include cumulative data for current year. The annual report for January 31, 1994, shall also include minimum, maximum, median, and average water quality data for the year, and a summary of water level data and integrity of the slurry wall. The report shall contain both tabular and graphical summaries of historical monitoring data.

4. SMP Revisions

Additional long term or temporary changes in the sample collection frequency and routine chemical analysis may become warranted as monitoring needs change. These changes shall be

based on the following criteria and shall be proposed in a SMR. The changes shall be implemented no earlier than 45 days after the SMR is submitted for review unless approved in writing.

Criteria for SMP revision:

- (1) Discontinued analysis for a routine chemical parameter for a specific well after a two-year period of below detection limit values for that parameter
- (2) Changes in sampling frequency for a specific well after a two-year period of below detection limit values for all chemical parameters from that well
- (3) Temporary increases in sampling frequency or changes in requested chemical parameters for a well or group of wells because of a change in data needs (e.g. evaluating reactive wall effectiveness or other remediation strategies).
- (4) Add routine analysis for a chemical parameter if the parameter appears as an additional chromatographic peak in three consecutive samples from a particular well
- (5) Alter sampling frequency based on evaluation of collective data base

D. DESCRIPTION OF SAMPLING STATIONS

See Table 2 and Figure 2 for monitoring wells installed at the time of the adoption of this SMP.

E. SCHEDULE OF SAMPLING AND ANALYSES

1. All wells at the Intersil site shall be sampled according to the schedule in Table 2 using EPA methods 8010 and 8020. EPA method 8240 shall be used in lieu of EPA methods 8010 and 8020 for all the wells during the fourth quarter of each year. New monitoring wells shall be sampled quarterly for at least one year, with specific monitoring frequency given in an updated Table 2. Sampling and monitoring shall be coordinated with other parties performing treatment and investigations in the area

November 19, 1993

including Western Microwave and Lockheed. Intersil is ultimately responsible for monitoring its wells, although results may be obtained from other parties performing investigations in the area.

2. In addition, if a previously undetected compound or peak is detected in a sample from a well, a second sample shall be taken within a week after the results from the first sample are available. All chromatographic peaks detected in two consecutive samples shall be identified and quantified in the SMR.
3. Groundwater elevations shall be obtained on a quarterly basis from all wells at the site and submitted in the self-monitoring report with the sampling results.
4. Well depths shall be determined on an annual basis and compared to the depth of the well as constructed. If greater than ninety percent of screen is covered, the discharger shall clear the screen by the next sampling.

I, Steven R. Ritchie, Executive Officer, hereby certify that the foregoing self-monitoring Program:

1. Has been developed in accordance with the procedure set forth in this Regional Board's Resolution No. 73-16 in order to obtain data and document compliance with site cleanup requirements established in Regional Board Order No. ....
2. May be reviewed at any time subsequent to the effective date upon written notice from the Executive Officer or request from the discharger, and revisions will be ordered by the Executive Officer or Regional Board.
3. Was adopted by the Board on November 19, 1993.

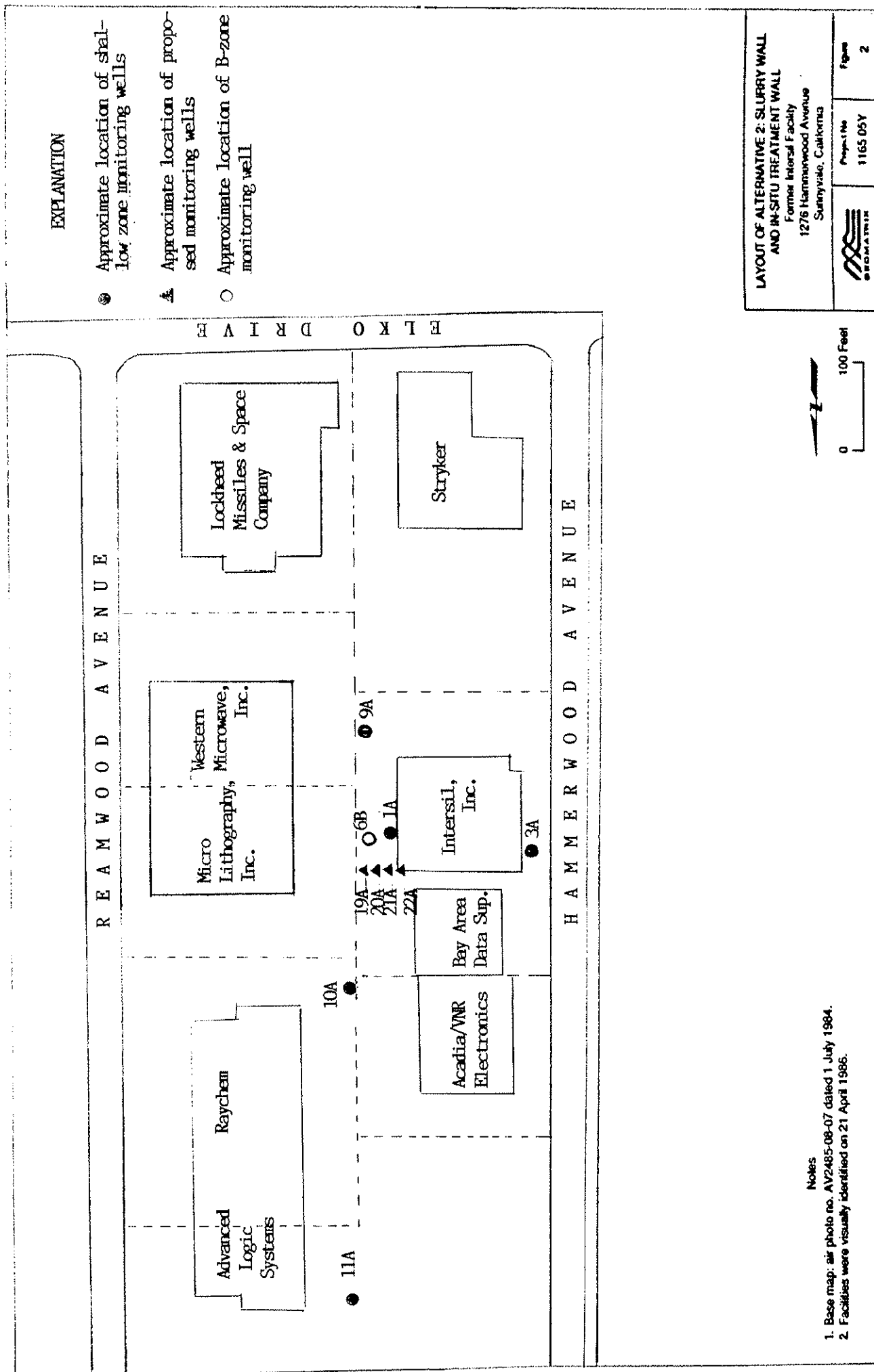
11/19/93  
Date

  
Steven R. Ritchie  
Executive Officer

Attachments: Table 2 - Monitoring Schedule  
Figure 2 - Wells Location Map

**TABLE 2**  
**MONITORING SCHEDULE FOR**  
**1276 HAMMEROOD AVENUE FACILITY**

<b>SHALLOW ZONE</b>		
<b>Quarterly</b>	<b>Semi-Annually</b>	<b>Annually</b>
1-A	9-A	
15-A.	3-A	
5-A.	10-A	
19-A	11-A	
20-A		
21-A		
22-A		
<b>INTERMEDIATE ZONE</b>		
<b>Quarterly</b>	<b>Semi-Annually</b>	<b>Annually</b>
	6-B	
<p><b><u>Note:</u></b> Once a year, all water samples from all wells should be analyzed using EPA Methods 8240. Other times, EPA Methods 8010 &amp; 8020 may be used.</p> <p>* Replace with new on-site monitoring wells if these wells are destroyed during construction.</p>		



EXPLANATION

- Approximate location of shallow zone monitoring wells
- ▲ Approximate location of proposed monitoring wells
- Approximate location of B-zone monitoring well

Notes

1. Base map: air photo no. AV2485-08-07 dated 1 July 1984.
2. Facilities were visually identified on 21 April 1986.



LAYOUT OF ALTERNATIVE 2: SLURRY WALL  
AND IN-SITU TREATMENT WALL  
Former Interfil Facility  
1276 Hammerwood Avenue  
Sunnyvale, California



Project No  
1165 05Y

Figure  
2